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by-hop routing" mentioned in the Background section, it just serves to differentiate the modified scheme with the scheme in Section 1 that the former has the characteristics of using a simple table-lookup in every hop on the route.--.

Page 17, replace lines 7-10 as follows: --Else, the small packet-forwarding table maps the route tag to the in-band-control signal for guiding the cell through the local switching fabric. The small packet-forwarding table may also map the route tag to a new route tag for the use by the subsequent node on the route, unless the route tag is not modified through the route as in the example of using an identifier of the egress node as the route tag. The cell format before entering the switching fabric becomes as in FIG. 8A.--.

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Page 18, replace line 9 as follows: --the switching control over the local switching fabric and possibly a new route tag--.

In the Claims:

Please cancel claims 1-3.

Please add claims 4-18 as follows:

--4. A method for routing a packet through a network composed of a plurality of switches as nodes, the packet having a packet header containing routing information and destined to traverse the network via a route which is determined by a sequence of nodes, wherein the first of the sequence of nodes is the ingress node through which the packet enters the network, and the last of the sequence of nodes is the egress node through which the packet exits from the network, the method comprising

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in the ingress node of the network,

translating the routing information into the route encoded as a sequence of in-band control signals,

fragmenting the packet into cells of a fixed length, and

affixing the sequence of in-band control signals in front of each one of the cells,

in each one of the sequence of nodes on the route, including the ingress node and the egress node,

deploying a corresponding one of the sequence of the in-band control signals in front of each one of the cells to guide said each one of the cells through said each one of the sequence of nodes, and

consuming said corresponding in-band control signal from the sequence of the in-band control signals of said each one of the cells, and

reassembling the cells into the packet in the egress node of the network.

5. A method for routing a packet through a packet switching network composed of a plurality of nodes, each of the nodes including a switching fabric with a plurality of input ports, a plurality of output ports, and a plurality of line cards wherein each of the line cards contains an input module and an output module, the packet carrying a packet header containing the routing information and destined to traverse the network via a route which is determined by a sequence of k nodes, $k \geq 1$, wherein the first of the sequence of nodes is the ingress node through which the packet enters the network, the

last of the sequence of nodes is the egress node through which the packet exits from the network, and wherein each of the nodes on the route has an active input module through which the packet enters the node and an active output module through which the packet exits from the node, the method comprising

at the active input module of the ingress node,

translating the routing information in the packet header into a sequence of k in-band control signals corresponding to the sequence of k nodes on the route,

fragmenting the packet into a plurality of cells of a fixed length,

affixing the sequence of k in-band control signals in front of each one of the cells, and

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forwarding each one of the cells to the input port of the switching fabric coupled to the active input module of the ingress node,

at the active input module of the j-th node on the route, $1<j\leq k$,

receiving each one of the cells from the (j−1)-th node on the route, and

forwarding each one of the cells to the input port of the switching fabric coupled to the active input module of said j-th node,

at the switching fabric of the j-th node on the route, $1\leq j\leq k$,

routing each one of the cells through the switching fabric of said j-th node, using the j-th one of the sequence of k in-band control signals, to the output port of the switching fabric coupled to the active output module of said j-th node, and

consuming said j-th in-band control signal,

at the active output module of the j-th node on the route, $1 \leq j < k$,

transmitting each one of the cells to the (j+1)-th node on the route, and

at the active output module of the egress node, reassembling the cells into the packet.

6. The method as recited in claim 5 wherein the output ports of the switching fabric of the j-th node on the route, $1 \leq j < k$, are grouped into a plurality of output groups such that the output ports within the same one of the output groups are exchangeable and each of the output groups of the switching fabric of said j-th node is coupled to one of the output modules of said j-th node, the generating of the sequence of in-band control signals at the active input module of the ingress node includes generating a sequence of k in-band control signals wherein the i-th in-band control signal, $1 \leq i < k$, corresponds to one of the output groups coupled to the active output module of the i-th node on the route, and the k-th in-band control signal corresponds to the output port coupled to the active output module of the egress node, such that the length of an in-band control signal corresponding to an output group is shorter than the length of an in-band control signal corresponding to an output port, and the routing includes routing each one of the cells through the switching fabric of said j-th node, using the j-th one of said sequence of k in-band control signals, to the output group of the switching fabric coupled to the active output module of said j-th node.

7. A method for processing a packet at an ingress node, the packet having

a packet header containing routing information, the method comprising

translating the routing information into a fixed route encoded as a sequence of in-band control signals,

fragmenting the packet into cells of a fixed length, and

inserting the sequence of in-band control signals in front of each of the cells.

8. A method for processing a packet at a node, the packet having a packet header containing routing information, the packet being pre-processed by (i) translating the routing information into a fixed route encoded as a sequence of in-band control signals, (ii) fragmenting the packet into cells of a fixed length, and (iii) inserting the sequence of in-band control signals in front of each of the cells, the method comprising

routing each of the cells through the node by deploying a corresponding one of the in-band control signals, and

consuming the corresponding one of the in-band control signals in the node.

9. Circuitry for routing a packet along a route, the packet having a packet header containing routing information, the circuitry comprising

an ingress node for receiving the packet, said ingress node including

a translator for translating the routing information into the route encoded as a sequence of in-band control signals,

fragmentation means for fragmenting the packet into cells of a fixed length, and

means for inserting the sequence of in-band control signals in front of each of the cells,

a sequence of nodes along the route, the first one of the sequence being linked to the ingress node, and

an egress node on the route, coupled to the last of the sequence of nodes, including means for reassembling the cells into the packet,

wherein each of the nodes including means for deploying a corresponding one of the in-band control signals to guide each of the cells through said each of the nodes and means for consuming said corresponding one of the in-band control signals in said each of the nodes.

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10. A network composed of a plurality of switches as nodes for routing a packet, the packet having a packet header containing routing information and destined to traverse the network via a route which is determined by a sequence of nodes, wherein the first of the sequence of nodes is the ingress node through which the packet enters the network, the last of the sequence of nodes is the egress node through which the packet exits from the network, the network comprising

in the ingress node,

a translator for translating the routing information into the route encoded as a sequence of in-band control signals,

fragmentation means for fragmenting the packet into cells of a fixed length, and

means for affixing the sequence of in-band control signals in front of each of the cells,

in each one of the sequence of nodes on the route, including the ingress node and the egress node,

means for deploying a corresponding one of the sequence of the in-band control signals in front of each one of the cells to guide said each of the cells through said each one of the sequence of nodes, and

means for consuming said corresponding in-band control signal from the sequence of the in-band control signals of said each one of the cells, and

in the egress node,

means for reassembling the cells into the packet.

11. A method for routing a packet through a network composed of a plurality of switches as nodes, each of the nodes having a switching fabric, the packet having a packet header containing routing information and destined to traverse the network via a route which is determined by a sequence of k nodes, $k \geq 1$, wherein the first of the sequence of nodes is the ingress node through which the packet enters the network, the last of the sequence of nodes is the egress node through which the packet exits from the network, the method comprising

in the ingress node of the network,

translating the routing information into a first in-band control signal for the switching control over the switching fabric of the ingress node, a route tag, and a last in-band control signal for the switching control over the switching fabric of the egress node,

fragmenting the packet into cells of a fixed length,

affixing a cell header including said first in-band control signal, said route tag and said last in-band control signal in front of each one of the cells,

deploying said first in-band control signal in the cell header of each one of the cells to guide said each one of the cells through the ingress node, and

consuming said first in-band control signal from the cell header of said each one of the cells,

in the j-th node on the route, $2 \leq j \leq (k-1)$,

inserting a j-th in-band control signal into the cell header of each one of the cells for the switching control over the switching fabric of said j-th node on the route, wherein said j-th in-band control signal is derived from the route tag in the cell header of each one of the cells,

deploying said j-th in-band control signal in the cell header of each one of the cells to guide said each one of the cells through said j-th node on the route, and

consuming said j-th in-band control signal from the cell header of each one of the cells, and

in the egress node of the network,

deploying the last in-band control signal for the egress node in front of each one of the cells to guide said each one of the cells through the egress node, and

reassembling the cells into the packet.

12. The method as recited in claim 11 wherein the translating in the ingress node includes translating the routing information into, apart from the first in-band control signal and the second in-band control signal, a route tag which is an identifier of the egress node.

13. A method for routing a packet through a network composed of a plurality of switches as nodes, each of the nodes having a switching fabric, the packet having a packet header containing routing information and destined to traverse the network via a route which is determined by a sequence of k nodes, $k \geq 1$, wherein the first of the sequence of nodes is the ingress node through which the packet enters the network, the last of the sequence of nodes is the egress node through which the packet exits from the network, the method comprising

in the ingress node of the network,

translating the routing information into a first in-band control signal for the switching control over the switching fabric of the ingress node, a first route tag for the use of the second node on the route, and a last in-band control signal for the switching control over the switching fabric of the egress node,

fragmenting the packet into cells of a fixed length,

affixing a cell header including said first in-band control signal, said first route tag and said last in-band control signal in front of each one of the cells,

deploying said first in-band control signal in the cell header of each one of the cells to guide said each one of the cells through the ingress node, and

consuming said first in-band control signal from the cell header of said each one of the cells,

in the j-th node on the route, $2 \leq j \leq (k-1)$,

inserting a j-th in-band control signal into the cell header of each one of the cells for the switching control over the switching fabric of said j-th node on the route, wherein said j-th in-band control signal is derived from the route tag in the cell header of each one of the cells,

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generating a j-th route tag for the use of the (j+1)-th node on the route based on the (j−1)-th route tag generated in the (j−1)-th node on the route to replace said (j−1)-th route tag in the cell header of each one of the cells,

deploying said j-th in-band control signal in the cell header of each one of the cells to guide said each one of the cells through said j-th node on the route, and

consuming said j-th in-band control signal from the cell header of each one of the cells, and

in the egress node of the network,

deploying the last in-band control signal for the egress node in front of each one of the cells to guide said each one of the cells through the egress node, and

reassembling the cells into the packet.

14. A method for routing a packet through a packet switching network composed of a plurality of nodes, each of the nodes including a switching fabric with a plurality of input ports, a plurality of output ports, and a plurality of line cards wherein each of the line cards contains an input module and an output module, the packet carrying a packet header containing the routing information and destined to traverse the network via a route which is determined by a sequence of k nodes, $k \geq 1$, wherein the first of the sequence of nodes is the ingress node through which the packet enters the network, the last of the sequence of nodes is the egress node through which the packet exits from the network, and wherein each of the sequence of nodes on the route has an active input module through which the packet enters the node and an active output module through which the packet exits from the node, the method comprising

at the active input module of the ingress node, wherein the active input module of the ingress node has a first packet-forwarding table,

translating the routing information, using said first packet-forwarding table, into a first in-band control signal for the switching control over the switching fabric of the ingress node, a route tag, and a last in-band control signal for the switching control over the switching fabric of the egress node,

fragmenting the packet into cells of a fixed length,

affixing a cell header including said first in-band control signal, said route tag and said last in-band control signal in front of each one of the cells, and

forwarding each one of the cells to the input port of the switching fabric coupled to the active input module of the ingress node,

at the switching fabric of the ingress node,

routing each one of the cells through the switching fabric of said j-th node, using said first in-band control signal in front of each one of the cells, to the output port of the switching fabric coupled to the active output module of the ingress node, and

consuming said first in-band control signal from the cell header of said each one of the cells,

at the active input module of the j-th node on the route, $2 \leq j \leq (k-1)$, wherein said active input module has a j-th packet-forwarding table which is smaller than the first packet-forwarding table,

receiving each one of the cells from the $(j-1)$-th node on the route,

inserting a j-th in-band control signal into the cell header of each one of the cells for the switching control over the switching fabric of said j-th node on the route, wherein said j-th in-band control signal is derived from the route tag in the cell header of each one of the cells using said j-th packet-forwarding table, and

forwarding each one of the cells to the input port of the switching fabric coupled to the active input module of said j-th node,

at the switching fabric of the j-th node on the route, $2 \leq j \leq (k-1)$,

routing each one of the cells through the switching fabric of said j-th node, using the j-th in-band control signal in the cell header of each one of the cells, to the output port of the switching fabric coupled to the active output module of said j-th node, and

consuming said j-th in-band control signal from the cell header of said each one of the cells,

at the active output module of the j-th node on the route, $1 \leq j < k$,

transmitting each one of the cells to the (j+1)-th node on the route,

at the active input module of the egress node,

receiving each one of the cells from the (k−1)-th node on the route, and

forwarding each one of the cells to the input port of the switching fabric coupled to the active input module of the egress node,

at the switching fabric of the egress node,

routing each one of the cells through the switching fabric of said j-th node, using the last in-band control signal in the cell header of each one of the cells, to the output port of the switching fabric coupled to the active output module of the egress node, and

consuming said last in-band control signal from the cell header of said each one of the cells,

at the active output module of the egress node, reassembling the cells into the packet.

15. The method as recited in claim 14 wherein the translating in the ingress node includes translating the routing information into, apart from the first in-band control signal and the second in-band control signal, a route tag which is an identifier of the egress node.

16. A method for routing a packet through a packet switching network composed of a plurality of nodes, each of the nodes including a switching fabric with a plurality of input ports and a plurality of output ports, the packet carrying a packet header containing the routing information and destined to traverse the network via a route which is determined by a sequence of k nodes, k>1, wherein the first of the sequence of nodes is the ingress node through which the packet enters the network, the last of the sequence of nodes is the egress node through which the packet exits from the network, the method comprising

in the ingress node on the route,

determining whether the ingress node is the egress node by examining the routing information of the packet,

if the ingress node is the egress node, translating the routing information into just a last in-band control signal for the switching control over the switching fabric of the egress node, fragmenting the packet into cells of a fixed length, affixing said last in-band control signal in front of each one of the cells, deploying said last in-band control signal in front of each one of the cells to guide said each one of the cells through the egress node, and reassembling the cells into the packet.

if the ingress node is not the egress node, translating the routing information into a first in-band control signal for the switching control over the switching fabric of the ingress node, a route tag, and a last in-band control signal for the switching control over the switching fabric of the egress node, fragmenting the packet into cells of a fixed length, affixing a cell header including said first in-band control signal, said route tag and said last in-band control signal in front of each one of the cells, deploying said first in-band control signal in front of each one of the cells to guide said each one of the cells through the ingress node, consuming said first in-band control signal from each one of the cells, and transmitting each one of the cells to the next succeeding one of the sequence of nodes on the route,

in the j-th node on the route, $2 \leq j \leq k$

receiving each one of the cells from the (j−1)-th node on the route,

determining whether said j-th node is the egress node by examining the route tag in the cell header of each one of the cells,

if said j-th node is the egress node, deploying the last in-band control signal in the cell header of each one of the cells to guide said each one of the cells through the egress node, and reassembling the cells into the packet,

if said j-th node is not the egress node no, inserting a j-th in-band control signal into the cell header of each one of the cells for the switching control over the switching fabric of said j-th node on the route, wherein said j-th in-band control signal is derived from the route tag in the cell header of each one of the cells, deploying said j-th in-band control signal in the cell header of each one of the cells to guide said each one of the cells through said each one of the sequence of nodes on the

route, consuming said j-th in-band control signal from the cell header of each one of the cells, and transmitting each one of the cells to the (j+1)-th node on the route.

17. The method as recited in claim 16 wherein the translating in the ingress node includes translating the routing information into, apart from the first in-band control signal and the second in-band control signal, a route tag which is an identifier of the egress node.

18. A system for routing a packet through a network composed of a plurality of switches as nodes, each of the nodes having a switching fabric, the packet having a packet header containing routing information and destined to traverse the network via a route which is determined by a sequence of k nodes, $k \geq 1$, wherein the first of the sequence of nodes is the ingress node through which the packet enters the network, the last of the sequence of nodes is the egress node through which the packet exits from the network, the system comprising

in the ingress node of the network,

a translator for translating the routing information into a first in-band control signal for the switching control over the switching fabric of the ingress node, a route tag, and a last in-band control signal for the switching control over the switching fabric of the egress node,

means for fragmenting the packet into cells of a fixed length,

means for affixing a cell header including said first in-band control signal, said route tag and said last in-band control signal in front of each one of the cells,

means for deploying said first in-band control signal in the cell header of each one of the cells to guide said each one of the cells through the ingress node, and

means for consuming said first in-band control signal from the cell header of said each one of the cells,

in the j-th node on the route, $2 \leq j \leq (k-1)$,

means for inserting a j-th in-band control signal into the cell header of each one of the cells for the switching control over the switching fabric of said j-th node on the route, wherein said j-th in-band control signal is derived from the route tag in the cell header of each one of the cells,

means for deploying said j-th in-band control signal in the cell header of each one of the cells to guide said each one of the cells through said j-th node on the route, and

means for consuming said j-th in-band control signal from the cell header of each one of the cells, and

in the egress node of the network,

means for deploying the last in-band control signal for the egress node in front of each one of the cells to guide said each one of the cells through the egress node, and

a reassembler for reassembling the cells into the packet.--.